atmosphere via conduit **161**. It has been found that a coordinated application of such a vacuum pressure to an individual during the inhalation process produces beneficial results such as alleviation of throat discomfort.

Vessel **170** serves dual functions of 1) acting as an intermediate vacuum chamber and 2) collecting any liquid which is inadvertently entrained in the air fluid flow in the conduit system.

One example of sensor **144** of the system of FIG. **1** is set forth in further detail in the diagram of FIG. **2**. Sensor **144** includes a variable impedance element such as a variable resistor **210** having a fixed terminal **212** coupled to a first end **143***a* of belt **142** and movable terminal **214** coupled to a second end **143***b* of belt **142**.

Additionally attached between the first terminal **212** and second terminal **214** of resistor **210** is a return bias spring **220**.

The value of the variable resistance exhibited between terminals **212** and **214** is coupled to input **154** of controller **150** via leads **172***a* and **172***b* of bus **172**.

As seen from the details of FIG. **2**, when the individual wearing belt **142** inhales, the abdominal cavity expands which pulls ends **143***a* and **143***b* of belt **142** further apart. This movement, in turn, causes the wiper or movable terminal **214** of resistor **210** to move toward the right as seen in the view of FIG. **2**, thus exhibiting a positive change in the resistance presented to terminals **172***a* and **172***b* of bus **172**. Conversely, when the inhalation period ends and exhalation begins, then the user's abdominal cavity will contract and the return spring element **220** will pull the movable terminal **214** back toward the rest position or to the left as shown in FIG. **2**. Hence, during this cycle a negative resistance change is exhibited at terminals **172***a* and **172***b*.

These positive and negative electrical resistance value changes are monitored by the controller **150**. For example, a microprocessor could be programmed to sample the electrical resistance presented via bus **172** ten times per second. The controller would enter a working condition after five stable cycles of breathing pattern were established. At this point, the controller would enable the vacuum pump **110** via regulator **180** only when controller **150** observes a positive change in resistance at input **154** of controller **150**.

The timing diagram of FIG. **5** sets forth the change in resistive impedance exhibited by sensor **144** along axis **506** versus time along axis **507**. Controller **150** enters a working routine after recognizing a predetermined number (e.g. 10) of stable or constant respiration pattern cycles.

During expiration phase **501**, the sensor's resistance change is negative which leads to action by controller **150** to inhibit the pulling of a partial vacuum in oral appliance **120**. In transition phase **502** where no resistance changes are observed, controller **150** continues inhibiting the pulling of a partial vacuum in appliance **120**. However, if controller **150** determines that phase **502** has extended for a time period indicating abnormality of the breathing pattern, such as is found during sleep apnea, controller **150** may initiate re-application of partial vacuum prior to the end of phase **502**. During inspiration phase **503**, controller **150** enables the pulling of a partial vacuum at appliance **120**. This pattern will continue for so long as a stable breathing pattern of predetermined minimum length is maintained. A stable breathing pattern may be defined as one exhibiting not only a steady overall breathing cycle time **505**, but also having intermediate periods **502** and **504**, which are of predetermined minimum durations wherein neither inhalation nor expiration are occurring.

Further details of appliance **120** and associated mouth cover **400** are set forth in FIGS. **3A**, **3B** and **4**. Opening **130** of FIG. **1** preferably, as shown in FIG. **3B** comprises a plurality of openings at an end of appliance **120** positioned furthest inward of the mammal's oral cavity.

Mouth cover **400** of FIGS. **3A**, and **3B** may take a variety of contoured shapes suitable for comfortable and leakless coupling of the partial vacuum to interior **132** of appliance **120** via conduit **121**. Holes **410** and **420** in cover **400** are provided for receipt of a strap (not shown) which would encircle the patient's head to keep the mouth cover in place.

An additional embodiment of the invention is set forth in the functional block diagram of FIG. **5**. The arrangement of FIG. **5** has many common features with the system of FIG. **1**, but with the addition of a positive or pressurized supply of air for application to the oral/throat cavity during expiration periods.

In the system of FIG. **5**, the human or mammalian body **500** has an appropriately coupled respiration sensor **544** and an oral appliance **520**. A programmed controlling unit **550** is coupled for receipt of signals from the respiration sensor **544**. Controlling unit **550** sets the flow position of a flow valve or switch **560** and can additionally set predetermined levels of vacuum and pressurized air via controlling unit outputs coupled to a first pressure regulator **580***a* and a second pressure regulator **580***b*.

Regulator **580***a* controls the vacuum level in chamber **570***a* which is evacuated by a vacuum air source **510**. Pressure regulator **580***b* controls the pressure level in chamber **570***b* which is supplied from a pressurized air source **590**.

Flow valve or switch **560**, under the control of unit **550**, applies either a predetermined vacuum level or a predetermined air pressure to the body's oral cavity via appliance **520**.

In operation, this system, in addition to applying at least a partial vacuum during periods of inspiration, additionally applies positive pressure via the oral appliance during periods of expiration.

The invention has been described with reference to an exemplary embodiment solely for the sake of example. Those skilled in the art will recognize that variations can be made to this specific example. The scope and spirit of the invention is defined by the appended claims.

I claim:

1. A method for inducing pressure changes in a mouth and throat cavity of a mammal comprising the steps of:

monitoring a respiration pattern of the mammal to determine a first time period during which the mammal is inhaling and a second time period during which the mammal is exhaling;

inducing at least a partial vacuum in the mammal's mouth and throat during the first time period; and

removing the at least partial vacuum during the second time period.

2. The method of claim **1** further comprising the step of inducing a positive pressure in the mammal's mouth during the second time period.

3. The method of claim **1** wherein the step of removing includes applying atmospheric pressure in the mammal's mouth.

4. Apparatus for inducing pressure changes in a mouth and throat cavity of a mammal, the apparatus comprising:

a vacuum source having a controlled output;

an appliance in fluid communication with the controlled output of the vacuum source, the appliance adapted for

placement in a mouth of a mammal so as to be in fluid communication therewith;

a sensor adapted to be coupled to a preselected portion of the mammal's anatomy and operative to generate a first signal whenever the mammal inhales and a second signal whenever the mammal exhales;

a controller having an output coupled to the controlled output of the vacuum source, and at least one input coupled for receipt of the first and second signals, the controller operative, upon receipt of the first signal, to cause the controlled output to pull at least a partial vacuum in the appliance, and the controller operative, upon receipt of the second signal, to cause the controlled output to cease pulling the at least partial vacuum.

5. The apparatus of claim **4** wherein the appliance comprises a conduit having a first end coupled to the controlled output of the vacuum source and a second end adapted for insertion into the mouth of the mammal.

6. The apparatus of claim **5** wherein the appliance further comprises an appliance coupled to the second end of the conduit and shaped for receipt by the mouth of the mammal, the appliance including at least one opening enabling fluid communication between the conduit and at least a portion of the mouth.

7. The apparatus of claim **6** wherein the appliance includes a plurality of openings arranged in a predetermined pattern, the plurality of openings enabling the fluid communication between the conduit and at least a portion of the mouth.

8. The apparatus of claim **4** wherein the sensor comprises a variable electrical impedance element coupled to the mammal's anatomy in a manner such that the impedance element exhibits a first impedance value change whenever the mammal is inhaling and a second impedance value change whenever the mammal is exhaling.

9. The apparatus of claim **8** wherein the sensor further comprises a belt having first and second ends, the belt adapted for placement around an abdominal cavity of the mammal, and wherein the variable electrical impedance element comprises a variable resistor having a fixed terminal coupled to the first end of the belt and a movable terminal coupled to the second end of the belt.

10. The apparatus of claim **9** further comprising a return spring coupled between the fixed and movable terminals of the variable resistor.

11. Apparatus for inducing pressure changes in a mouth and throat cavity of a mammal, the apparatus comprising:

a regulated vacuum source having a controlled output;

a fluid switch having first, second and third ports, the first port coupled in fluid communication with the controlled output, and the second port coupled in fluid communication with ambient atmosphere;

an appliance in fluid communication with the third port of the fluid switch, the appliance adapted for placement in a mouth of a mammal so as to be in fluid communication therewith;

a sensor adapted to be coupled to a preselected portion of the mammal's anatomy and operative to generate a first signal whenever the mammal inhales and a second signal whenever the mammal exhales;

a controller having an output coupled to the fluid switch and having at least one input coupled for receipt of the first and second signals, the controller operative, upon receipt of the first signal, to cause the fluid switch to fluidly couple the first port to the third port, and the controller operative, upon receipt of the second signal, to cause the fluid switch to fluidly couple the second port to the third port.

12. Apparatus for inducing pressure changes in a mouth and throat cavity of a mammal, the apparatus comprising:

a regulated vacuum source having a controlled vacuum output;

a regulated pressurized air source having a controlled pressurized air output;

a fluid switch having first, second and third ports, the first port coupled in fluid communication with the controlled vacuum output and the second port coupled in fluid communication with the pressurized air output;

an appliance in fluid communication with the third port of the fluid switch, the appliance adapted for placement in a mouth of a mammal so as to be in fluid communication therewith;

a sensor adapted to be coupled to a preselected portion of the mammal's anatomy and operative to generate a first signal whenever the mammal inhales and a second signal whenever the mammal exhales;

a controller having an output coupled to the fluid switch and having at least one input coupled for receipt of the first and second signals, the controller operative, upon receipt of the first signal, to cause the fluid switch to fluidly couple the first port to the third port, and the controller operative, upon receipt of the second signal, to cause the fluid switch to fluidly couple the second port to the third port.

* * * * *

13. A method for inducing pressure changes in a mouth cavity of a mammal comprising the steps of:

monitoring a respiration pattern of the mammal to determine a first time period during which the mammal is inhaling and a second time period during which the mammal is exhaling;

inducing at least a partial vacuum in the mammal's mouth during the first time period; and

removing the at least partial vacuum during the second time period.

14. The method of claim 13 further comprising the step of inducing a positive pressure in the mammal's mouth during the second time period.

15. The method of claim 13 wherein the step of removing includes applying atmospheric pressure in the mammal's mouth.

16. Apparatus for inducing pressure changes in a mouth cavity of a mammal, the apparatus comprising:

a vacuum source having a controlled output;

an appliance in fluid communication with the controlled output of the vacuum source, the appliance adapted for placement in a mouth of a mammal so as to be in fluid communication therewith;

a sensor adapted to be coupled to a preselected portion of the mammal's anatomy and operative to generate a first signal whenever the mammal inhales and a second signal whenever the mammal exhales;

a controller having an output coupled to the controlled output of the vacuum source, and at least one input coupled for receipt of the first and second signals, the controller operative, upon receipt of the first signal, to cause the controlled output to pull at least a partial vacuum in the appliance, and the controller operative, upon receipt

of the second signal, to cause the controlled output to cease pulling the at least partial vacuum.

17. The apparatus of claim 16 wherein the appliance comprises a conduit having a first end coupled to the controlled output of the vacuum source and a second end adapted for insertion into the mouth of the mammal.

18. The apparatus of claim 17 wherein the appliance further comprises an appliance coupled to the second end of the conduit and shaped for receipt by the mouth of the mammal, the appliance including at least one opening enabling fluid communication between the conduit and at least a portion of the mouth.

19. The apparatus of claim 18 wherein the appliance includes a plurality of openings arranged in a predetermined pattern, the plurality of openings enabling the fluid communication between the conduit and at least a portion of the mouth.

20. The apparatus of claim 16 wherein the sensor comprises a variable electrical impedance element coupled to the mammal's anatomy in a manner such that the impedance element exhibits a first impedance value change whenever the mammal is inhaling and a second impedance value change whenever the mammal is exhaling.

21. The apparatus of claim 20 wherein the sensor further comprises a belt having first and second ends, the belt adapted for placement around an abdominal cavity of the mammal, and wherein the variable electrical impedance element comprises a variable resistor having a fixed terminal coupled to the first end of the belt and a movable terminal coupled to the second end of the belt.

22. The apparatus of claim 21 further comprising a return spring coupled between the fixed and movable terminals of the variable resistor.

23. Apparatus for inducing pressure changes in a mouth cavity of a mammal, the apparatus comprising:

a regulated vacuum source having a controlled output;

a fluid switch having first, second and third ports, the first port coupled in fluid communication with the controlled output, and the second port coupled in fluid communication with ambient atmosphere;

an appliance in fluid communication with the third port of the fluid switch, the appliance adapted for placement in a mouth of a mammal so as to be in fluid communication therewith;

a sensor adapted to be coupled to a preselected portion of the mammal's anatomy and operative to generate a first signal whenever the mammal inhales and a second signal whenever the mammal exhales;

a controller having an output coupled to the fluid switch and having at least one input coupled for receipt of the first and second signals, the controller operative, upon receipt of the first signal, to cause the fluid switch to fluidly couple the first port to the third port, and the controller operative, upon receipt of the second signal, to cause the fluid switch to fluidly couple the second port to the third port.

24. Apparatus for inducing pressure changes in a mouth cavity of a mammal, the apparatus comprising:

a regulated vacuum source having a controlled vacuum output;

a regulated pressurized air source having a controlled pressurized air output;

a fluid switch having first, second and third ports, the first port coupled in fluid communication with the controlled vacuum output and the second port coupled in fluid communication with the pressurized air output;

an appliance in fluid communication with the third port of the fluid switch, the appliance adapted for placement in a mouth of a mammal so as to be in fluid communication therewith;

a sensor adapted to be coupled to a preselected portion of the mammal's anatomy and operative to generate a first signal whenever the mammal inhales and a second signal whenever the mammal exhales;

a controller having an output coupled to the fluid switch and having at least one input coupled for receipt of the first and second signals, the controller operative, upon receipt of the first signal, to cause the fluid switch to fluidly couple the first port to the third port, and the controller operative, upon receipt of the second signal, to cause the fluid switch to fluidly couple the second port to the third port.